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(73)実用新案権者 000001937  
 日本電気ホームエレクトロニクス株式会社  
 大阪府大阪市中央区城見一丁目4番24号  
 (72)考案者 南 茂雄  
 大阪府大阪市中央区城見一丁目4番24号  
 日本電気ホームエレクトロニクス株式会社内

審査官 祖司 英史

(56)参考文献 特開 平3-77515 (J P, A)  
 特開 平4-97720 (J P, A)  
 特公 昭63-25772 (J P, B 2)

## (54)【考案の名称】 掃除ロボット

## (57)【実用新案登録請求の範囲】

【請求項1】 床面の塵埃を吸引する吸引部と吸引部へ吸引圧力を供給する吸引モータと吸引された塵埃を蓄積する塵埃パックとこれらを包囲する外観部とで構成される掃除機本体と、掃除機本体を床面に沿って走行させる車両構造とから構成される掃除ロボットにおいて、外観部周囲に吸引モータの排気によってふくらむタイヤ状ダンパーと、タイヤ状ダンパーに空気圧によって作動するスイッチ部を備えた掃除ロボット。

【請求項2】 タイヤ状ダンパーの空気圧、又は変形によって作動し、車両構造の操舵輪と連結したピストン部を備えたことを特徴とする請求項1記載の掃除ロボット。

## 【考案の詳細な説明】

## 【0001】

【産業上の利用分野】 本考案は、掃除ロボットに関し、

特に掃除ロボットの操舵輪を操作する手段を併せ持った緩衝機構に関する。

## 【0002】

【従来の技術】 従来、この種の掃除ロボットの緩衝機構は図8に示すようにロボット本体28に中実のゴム状弾性体29を設置したものであった。掃除ロボットが壁などに衝突したときには、このゴム状弾性体29の弾力がクッションとなっていた。

## 【0003】

【考案が解決しようとする課題】 従来の掃除ロボットの緩衝機構は、中実のゴム状弾性体で作られており、寿命を長くすることから比較的硬い材料で作られていた。従って、掃除ロボットの壁などの衝突時の衝撃に対して充分なクッション性を持たせることが出来ず、掃除ロボットを損傷させたり壁等を傷つける可能性があった。

**【0004】**それ故に、本考案の目的は、掃除ロボットがソフトウェアによってコントロールされる場合には、壁等との衝突時において充分なクッション性を持った緩衝機構を、掃除ロボットがソフトウェアでサポートされないノンコントロールの場合には、操舵輪のコントロール機能を持ちなおかつかつ充分なクッション性を持った緩衝機構を提供することにある。

#### **【0005】**

**【課題を解決するための手段】**従って、本考案は上述の目的を達成するために、掃除ロボットの外観部周囲に吸引モータからの排気によってふくらむタイヤ状ダンパと、タイヤ状ダンパに空気圧によって作動するスイッチ部を備え、又はタイヤ状ダンパの空気圧或いは変形によつて作動し車輪構造の操舵輪と連結したピストン部を備えたものである。

#### **【0006】**

**【作用】**この考案によれば、掃除ロボットの外観部周囲に設置されたタイヤ状ダンパは、壁等との衝突による衝撃を弱めるためのクッションの働きをし、タイヤ状ダンパの空気圧又は変形によつて作動する車輪構造の操舵輪と連結したピストン部は、掃除ロボットが壁等と衝突したときに操舵輪をある角度回転させて掃除ロボットの走行方向を変化させる働きをし、スイッチは衝突の検知又は掃除ロボットの前後進切換スイッチの働きをし、掃除ロボットが壁等と衝突したときに、充分なクッション性を持たせ、またソフトでコントロールされないノンコントロール方式の掃除ロボットにおいても、ソフトでコントロールされたと同等の掃除効果を持たせることが可能となつた。

#### **【0007】**

**【実施例】**次に、本考案の一実施例について図1～図7を参照して説明する。

**【0008】**図において、ソフトによってコントロールされて走行する掃除ロボット1は、ロボット本体2と、ロボット本体2に設けられた緩衝機構3と、ロボット本体2と緩衝機構3を床面4に沿つて走行させる車輪構造5とを備えている。

**【0009】**緩衝機構3は中空となつたタイヤ状ダンパ6（ゴム状弾性体）と、ロボット本体2を構成している吸引モータ7の排気部8とタイヤ状ダンパ6を空気的に連結する配管9と、タイヤ状ダンパ6に設置された外界へ開放となつた排気逃しノズル10と、タイヤ状ノズル6の中空部11とピストン12を介してつながりスイッチ13及び復元バネ14を有したスイッチ部15を備えている。

**【0010】**ソフトによってコントロールされないノンコントロール方式の掃除ロボット16は、上記のコントロール方式の構成に新たにタイヤ状ダンパ17の中空部18にバネ19によつて支えられたピストン20を設け、ピストン20の他端21を車輪構造5の操舵輪22

と連結し、又は中空部23を構成しているタイヤ状ダンパ24にピストン25を設け、他端26を操舵輪27と連結している。

**【0011】**次に動作について説明する。図5に見るようなブロック図に従つて、掃除ロボット1、16は走行し、ソフトでコントロールされて走行するコントロール方式の掃除ロボット1の場合は、スタート命令によつて掃除ロボット1は前進走行し、何らかの原因でコントロール不能となつたとき、壁等に衝突する。この時タイヤ状ダンパ6の中空部11の空気圧が瞬間に上昇し、ピストン12が動作し、スイッチ13が働き、衝突を検知し、掃除ロボット1は停止する。次に、以上状態を解決し（RESET）、再び走行させる。

**【0012】**ソフトでコントロールされないノンコントロール方式の掃除ロボット16の場合は、スタート命令によつて掃除ロボット16は壁等へ衝突するまで走行し続け、壁等へ衝突したときは同じくスイッチ13が働き、同時に図6に示すように中空部23の圧力上昇又はタイヤ状ダンパ24の変形によつてピストン20、25が動作し操舵輪22、27の操舵角を操作させ、掃除ロボット16は転回しながら方向転換をする。スイッチ13は前、後進切換スイッチとして働く。掃除ロボット16の転回しながらの方向転換中にバネ19の復元力によつてピストン20は戻されていく、操舵輪22、27の操舵角は元に戻る。

**【0013】**この結果、掃除ロボット16は図7に示すような動作を行なうことになる。

**【0014】**よつて緩衝機構3を吸引モータ7の排気を利用したタイヤ状ダンパ6、17、24とすることにより、クッション性の良いダンパを提供でき、なおかつノンコントロール方式の掃除ロボット16においては、図7に示したように床面4を重複して掃除するがなくなり、コントロール方式の掃除ロボット1に近いより効果的な掃除が可能となつた。

#### **【0015】**

**【考案の効果】**以上説明したように本考案は、掃除ロボットの緩衝機構に吸引モータの排気を利用したタイヤ状ダンパを適用し、ノンコントロール方式の掃除ロボットにタイヤ状ダンパと前後進切換スイッチと操舵輪の操舵角操作手段を備えることにより、クッション性の良い緩衝機構を提供でき、なおかつコントロールされた方式の掃除ロボットと同等な掃除効果の期待が出来るノンコントロール方式の掃除ロボットが提供できる。

#### **【図面の簡単な説明】**

**【図1】**本考案の掃除ロボットの実施例の側面図である。

**【図2】**本考案の緩衝機構の一実施例の上面断面図である。

**【図3】**本考案の緩衝機構の第二の実施例の上面断面図である。

【図4】本考案の緩衝機構の第三の実施例の上面断面図である。

【図5】本考案の動作を説明するブロック図である。

【図6】本考案の第二、三の実施例の一部分の断面図である。

【図7】本考案の第二、三の実施例の動作を説明する図である。

【図8】従来の実施例の側面図である。

【符号の説明】

1、16 掃除ロボット

2、28 ロボット本体

3 緩衝機構

4 床面

5 車輪構造

6、17、24 タイヤ状ダンパー

7 吸引モータ

8 排気部

9 配管

10 排気逃しノズル

11、18、23 中空部

12、20、25 ピストン

13 スイッチ

14 復元バネ

15 スイッチ部

19 バネ

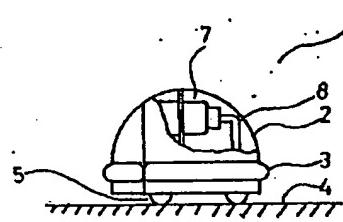
21、26 他端

22、27 操舵輪

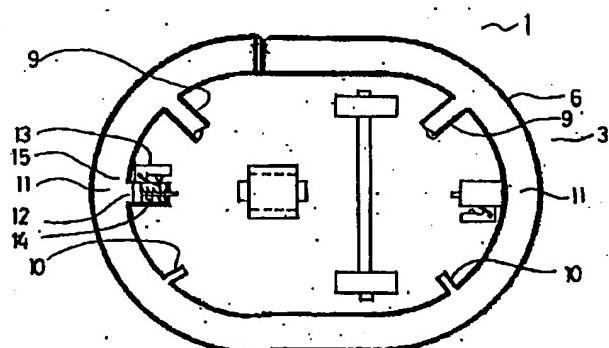
29 ゴム弾性体

【図1】

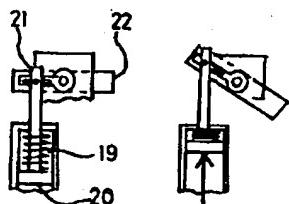
【図2】



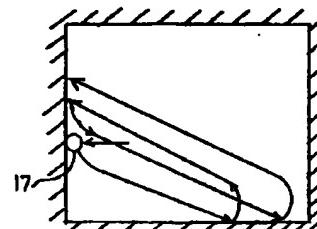
【図6】



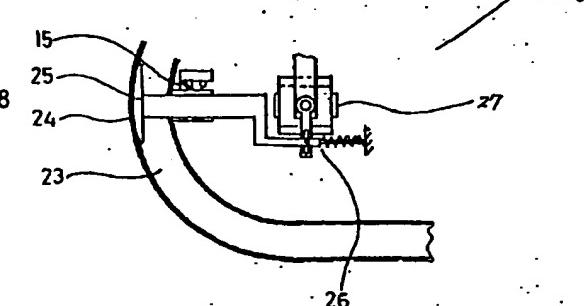
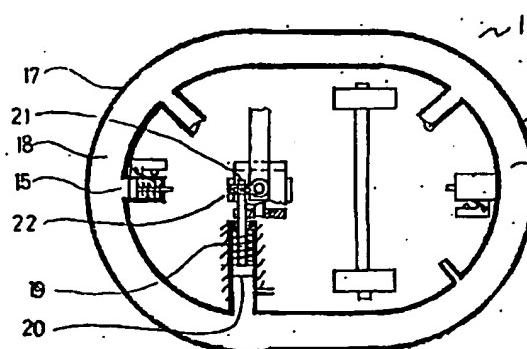
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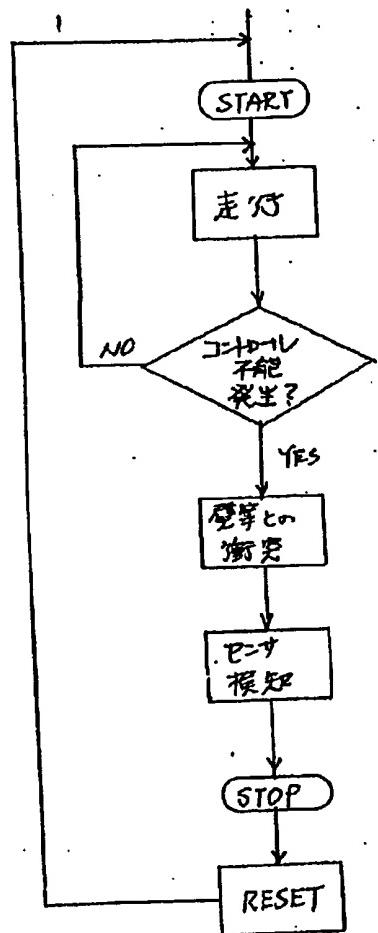
【図7】



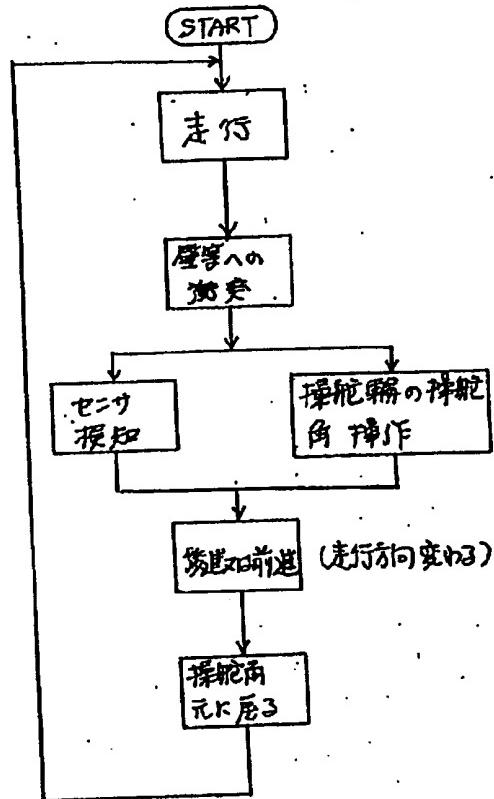
【図4】



【図5】



(コントロール方式の場合)



(ノンコントロール方式の場合)

**\* NOTICES \***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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## CLAIMS

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### (57) [Utility model registration claim]

[Claim 1] The body of a cleaner which consists of a suction motor which supplies suction pressure to the suction section which attracts the dust of a floor line, and the suction section, a dust pack which accumulates the attracted dust, and the appearance section which surrounds these, The cleaning robot which equipped the tire-like damper which swells with exhaust air of a suction motor to the perimeter of the appearance section, and the tire-like damper with the switch section which operates with pneumatic pressure in the cleaning robot which consists of car structures of making it running the body of a cleaner along a floor line.

[Claim 2] The cleaning robot according to claim 1 characterized by having the piston section which operated according to the pneumatic pressure of a tire-like damper, or deformation, and was connected with the steering wheel of car structure.

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## DETAILED DESCRIPTION

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### [Detailed explanation of a design]

#### [0001]

[Industrial Application] Especially this design is related with the buffer device having a means to operate a cleaning robot's steering wheel, about a cleaning robot.

#### [0002]

[Description of the Prior Art] Conventionally, this kind of cleaning robot's buffer device installed the rubber-like elasticity object 29 of a solid in the robot body 28, as shown in drawing 8. When a cleaning robot collided with a wall etc., the elasticity of this rubber-like elasticity object 29 had become a cushion.

#### [0003]

[Problem(s) to be Solved by the Device] The conventional cleaning robot's buffer device is made from the rubber-like elasticity object of a solid, and was made from lengthening a life with the comparatively hard ingredient. Therefore, sufficient cushioning properties could not be given to the impact at the time of the collision with a cleaning robot's wall etc., but the cleaning robot may have been damaged and the wall etc. may have been damaged.

[0004] so -- the case of the non control by which a cleaning robot is not supported by software in the buffer device which had sufficient cushioning properties at the time of the collision with a wall etc. when, as for the purpose of this design, a cleaning robot is controlled by software -- the control function of a steering wheel -- having -- in addition -- and it is in offering a buffer device with sufficient cushioning properties.

[0005]

[Means for Solving the Problem] Therefore, in order to attain the above-mentioned purpose, this design equips the tire-like damper which swells with the exhaust air from a suction motor around [ the appearance section ] a cleaning robot, and a tire-like damper with the switch section which operates with pneumatic pressure, or is equipped with the piston section which operated according to the pneumatic pressure of a tire-like damper, or deformation, and was connected with the steering wheel of wheel structure.

[0006]

[Function] According to this design, the tire-like damper installed in a cleaning robot's perimeter of the appearance section The piston section connected with the steering wheel of the wheel structure which commits the cushion for weakening the impact by the collision with a wall etc., and operates according to the pneumatic pressure of a tire-like damper or deformation When a cleaning robot collides with a wall etc., a certain work to which include-angle rotation is carried out and a cleaning robot's transit direction is changed is carried out for a steering wheel. When a switch commits the pre-go-astern change-over switch of detection of a collision, or a cleaning robot and a cleaning robot collides with a wall etc. It became possible to give the equivalent cleaning effectiveness as having given sufficient cushioning properties, and it having been soft, having been soft also in the cleaning robot of a non control method which is not controlled, and having been controlled.

[0007]

[Example] Next, one example of this design is explained with reference to drawing 1 - drawing 7

[0008] In drawing, the cleaning robot 1 which runs by being controlled by software has the robot body 2, the buffer device 3 prepared in the robot body 2, and the robot body 2 and the wheel structure 5 which makes it run the buffer device 3 along a floor line 4.

[0009] The piping 9 which connects in air the tire-like damper 6 (rubber-like elasticity object) with which the buffer device 3 became hollow, and the exhaust air section 8 and the tire-like damper 6 of the suction motor 7 which constitutes the robot body 2, It has the switch section 15 with [ \*\*\*\*\*], and it is connected through the centrum 11 and piston 12 of a nozzle 10 and the tire-like nozzle 6, and ] a switch 13 and the restoration spring 14 which was opened to the external world installed in the tire-like damper 6.

[0010] The cleaning robot 16 of a non control method which is not controlled by software formed the piston 25 in the tire-like damper 24 which newly forms the piston 20 supported with the spring 19 in the centrum 18 of the tire-like damper 17 in the configuration of the above-mentioned control method, and connects the other end 21 of a piston 20 with the steering wheel 22 of wheel structure 5, or constitutes the centrum 23, and has connected the other end 26 with the steering wheel 27.

[0011] Next, actuation is explained. In the case of the cleaning robot 1 of the control method the cleaning robots 1 and 16 run according to a block diagram which is seen to drawing 5, and it runs by being soft and being controlled, when the cleaning robot 1 does advance transit with a start instruction and it becomes control impossible by a certain cause, it collides with a wall etc. At this time, the pneumatic pressure of the centrum 11 of the tire-like damper 6 rises momentarily, a piston 12 operates, a switch 13 works, a collision is detected, and the cleaning robot 1 stops. Next, a condition is solved above (RESET) and it is made to run again.

[0012] It is soft, in the case of the cleaning robot 16 of a non control method which is not controlled, it runs continuously until the cleaning robot 16 collides to a wall etc. with a start

instruction, when it collides to a wall etc., similarly a switch 13 works, pistons 20 and 25 operate according to deformation of the pressure buildup of a centrum 23 or the tire-like damper 24, and make the steering angle of steering wheels 22 and 27 operate it, as shown in coincidence at drawing 6, and a cleaning robot 16 changes the course, revolving. A switch 13 works as a go-astern change-over switch a front. The piston 20 is returned according to the stability of a spring 19 during the turn while the cleaning robot 16 revolves, and the steering angle of steering wheels 22 and 27 returns.

[0013] Consequently, the cleaning robot 16 will perform actuation as shown in drawing 7.

[0014] therefore, the thing for which the buffer device 3 is used as the tire-like dampers 6, 17, and 24 using exhaust air of the suction motor 7 -- the good damper of cushioning properties -- it can provide -- in addition -- and in the cleaning robot 16 of a non control method, as shown in drawing 7 R> 7, overlapping and cleaning a floor line 4 was lost, and effective cleaning was attained rather than close to the cleaning robot 1 of a control method.

[0015]

[Effect of the Device] this design applying the tire-like damper which used in exhaust air of a suction motor to a cleaning robot's buffer device, as having explained above, and having the steering angle actuation means of a tire-like damper, a pre-go-astern change-over switch, and a steering wheel to the cleaning robot of a non control method -- the good buffer device of cushioning properties -- it can provide -- in addition -- and it can provide in the cleaning robot of the non control method which can perform expectation of the cleaning effectiveness equivalent to the controlled cleaning robot of a method.

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## TECHNICAL FIELD

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[Industrial Application] Especially this design is related with the buffer device having a means to operate a cleaning robot's steering wheel, about a cleaning robot.

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## PRIOR ART

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[Description of the Prior Art] Conventionally, this kind of cleaning robot's buffer device installed the rubber-like elasticity object 29 of a solid in the robot body 28, as shown in drawing 8. When a cleaning robot collided with a wall etc., the elasticity of this rubber-like elasticity object 29 had become a cushion.

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## EFFECT OF THE INVENTION

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Device] The conventional cleaning robot's buffer device is made from the rubber-like elasticity object of a solid, and was made from lengthening a life with the comparatively hard ingredient. Therefore, sufficient cushioning properties could not be given to the impact at the time of the collision with a cleaning robot's wall etc., but the cleaning robot may have been damaged and the wall etc. may have been damaged.

[0004] so -- the case of the non control by which a cleaning robot is not supported by software in the buffer device which had sufficient cushioning properties at the time of the collision with a wall etc. when, as for the purpose of this design, a cleaning robot is controlled by software -- the control function of a steering wheel -- having -- in addition -- and it is in offering a buffer device with sufficient cushioning properties.

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## MEANS

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[Means for Solving the Problem] Therefore, in order to attain the above-mentioned purpose, this design equips the tire-like damper which swells with the exhaust air from a suction motor around [ the appearance section ] a cleaning robot, and a tire-like damper with the switch section which operates with pneumatic pressure, or is equipped with the piston section which operated according to the pneumatic pressure of a tire-like damper, or deformation, and was connected with the steering wheel of wheel structure.

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## OPERATION

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[Function] According to this design, the tire-like damper installed in a cleaning robot's perimeter of the appearance section The piston section connected with the steering wheel of the wheel structure which commits the cushion for weakening the impact by the collision with a wall etc., and operates according to the pneumatic pressure of a tire-like damper or deformation When a cleaning robot collides with a wall etc., a certain work to which include-angle rotation is carried out and a cleaning robot's transit direction is changed is carried out for a steering wheel. When a switch commits the pre-go-astern change-over switch of detection of a collision, or a cleaning robot and a cleaning robot collides with a wall etc. It became possible to give the equivalent cleaning effectiveness as having given sufficient cushioning properties, and it having been soft, having been soft also in the cleaning robot of a non control method which is not controlled, and having been controlled.

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## EXAMPLE

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[Example] Next, one example of this design is explained with reference to drawing 1 - drawing 7

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body 2, the buffer device 3 prepared in the robot body 2, and the robot body 2 and the wheel structure 5 which makes it run the buffer device 3 along a floor line 4.

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[0010] The cleaning robot 16 of a non control method which is not controlled by software formed the piston 25 in the tire-like damper 24 which newly forms the piston 20 supported with the spring 19 in the centrum 18 of the tire-like damper 17 in the configuration of the above-mentioned control method, and connects the other end 21 of a piston 20 with the steering wheel 22 of wheel structure 5, or constitutes the centrum 23, and has connected the other end 26 with the steering wheel 27.

[0011] Next, actuation is explained. In the case of the cleaning robot 1 of the control method the cleaning robots 1 and 16 run according to a block diagram which is seen to drawing 5, and it runs by being soft and being controlled, when the cleaning robot 1 does advance transit with a start instruction and it becomes control-impossible by a certain cause, it collides with a wall etc. At this time, the pneumatic pressure of the centrum 11 of the tire-like damper 6 rises momentarily, a piston 12 operates, a switch 13 works, a collision is detected, and the cleaning robot 1 stops. Next, a condition is solved above (RESET) and it is made to run again.

[0012] It is soft, in the case of the cleaning robot 16 of a non control method which is not controlled, it runs continuously until the cleaning robot 16 collides to a wall etc. with a start instruction, when it collides to a wall etc., similarly a switch 13 works, pistons 20 and 25 operate according to deformation of the pressure buildup of a centrum 23 or the tire-like damper 24, and make the steering angle of steering wheels 22 and 27 operate it, as shown in coincidence at drawing 6, and a cleaning robot 16 changes the course, revolving. A switch 13 works as a go-aftern change-over switch a front. The piston 20 is returned according to the stability of a spring 19 during the turn while the cleaning robot 16 revolves, and the steering angle of steering wheels 22 and 27 returns.

[0013] Consequently, the cleaning robot 16 will perform actuation as shown in drawing 7.

[0014] therefore, the thing for which the buffer device 3 is used as the tire-like dampers 6, 17, and 24 using exhaust air of the suction motor 7 -- the good damper of cushioning properties -- it can provide -- in addition -- and in the cleaning robot 16 of a non control method, as shown in drawing 7 R> 7, overlapping and cleaning a floor line 4 was lost, and effective cleaning was attained rather than close to the cleaning robot 1 of a control method.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the side elevation of the example of the cleaning robot of this design.

[Drawing 2] It is the top-face sectional view of one example of the buffer device of this design.

[Drawing 3] It is the top-face sectional view of the second example of the buffer device of this design.

[Drawing 4] It is the top-face sectional view of the third example of the buffer device of this

design.

[Drawing 5] It is a block diagram explaining actuation of this design.

[Drawing 6] They are some sectional views of the second and 3 example of this design.

[Drawing 7] It is drawing explaining actuation of the second and 3 example of this design.

[Drawing 8] It is the side elevation of the conventional example.

[Description of Notations]

1 16 Cleaning robot

2 28 Robot body

3 Buffer Device

4 Floor Line

5 Wheel Structure

6, 17, 24 Tire-like damper

7 Suction Motor

8 Exhaust Air Section

9 Piping

10 it \*\*\*\*\* -- Nozzle

11, 18, 23 Centrum

12, 20, 25 Piston

13 Switch

14 Restoration Spring

15 Switch Section

19 Spring

21 26 Other end

22 27 Steering wheel

29 Rubber Elasticity Object